A Low Cost, Light Weight, Polymer Derived Ceramic Telescope Mirror

United Materials & Systems Inc

Discussion Points

- Brief History of the Company
- Brief History the Technology
- Overview of Technology Fit
- Deliverable for NASA
- Summary

Brief History of the Company

3 Inventors

Business Structure

Business Development with
UCF Venture Lab

3 Inventors

Arnold Hill

Masters Degree Student

Dr. Linan An, UCF

Associate Professor and Director

Materials Processing Laboratory
Advanced Materials Processing & Analysis Center (AMPAC)
University of Central Florida

Dr. Weifeng Fei

Post Doc

Business Structure

Dr. Linan An, UCF
Technical
Advisory Board

Mark Tellam, PE
Board,
Business Development

Arnold Hill
President

Fengxia Ma
Principal Investigator

Dr. Weifeng Fei
Technical Staff

Business Development with UCF

Florida High Tech Corridor Council
(UCF, USF, UFL)

Provided External Matching Grant

UCF Venture Lab Mentoring
(UCF Business School)

Brief History of the Technology

- Coating Applications
- Nano Technology Extensions
- Bulk Material Applications

Coating Applications

Clear

Anti Corrosion

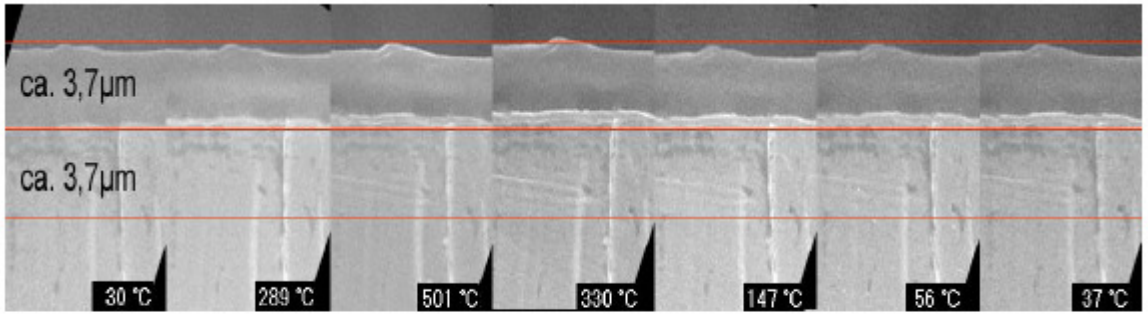
Gas Barrier

Easy to Clean

High Temperature

Ref:Clariant

Corrosion protection coatings



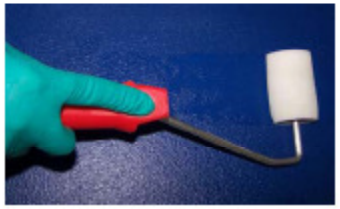
ESEM (environmental scanning electron microscopy) Experiment:

Curing of polysilazane layer on a metal surface: dimensional stability

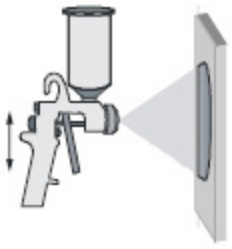
Coating Applications

Application of PZane formulations

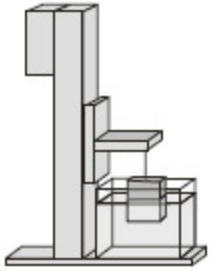
Wiping



Roll coating



Spray coating



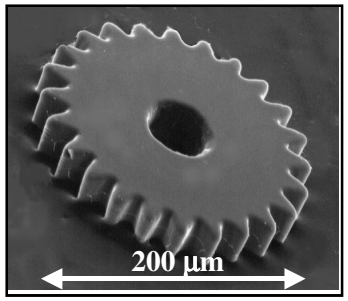
Dip coating

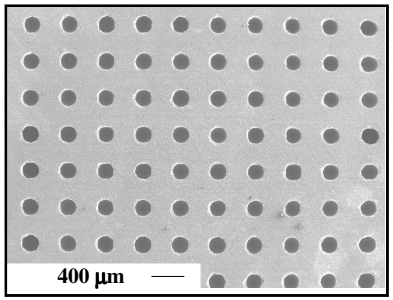
Spin coating

Ref:Clariant

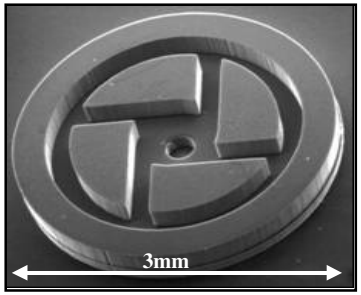
Nano Technology Extensions

Lithographically Defined Structures & Components





Micro Fluidics



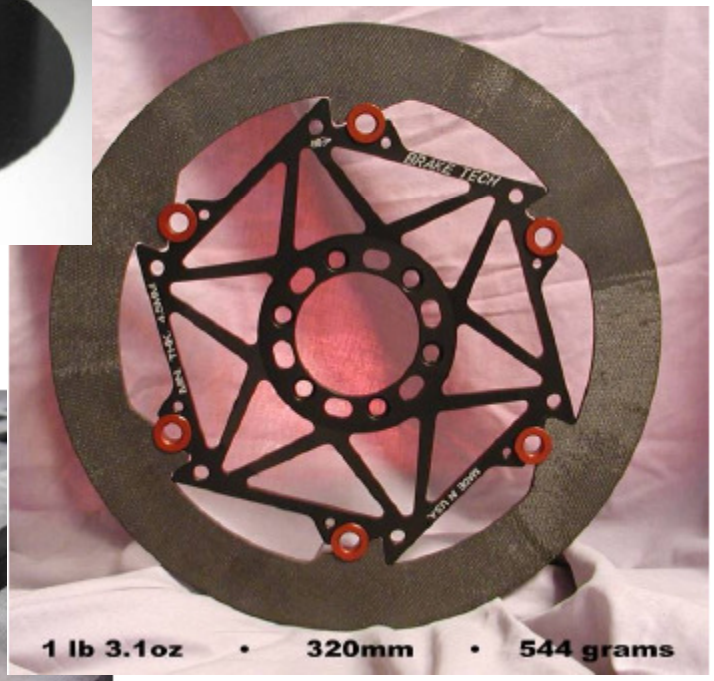
Ref: UCF AMPAC

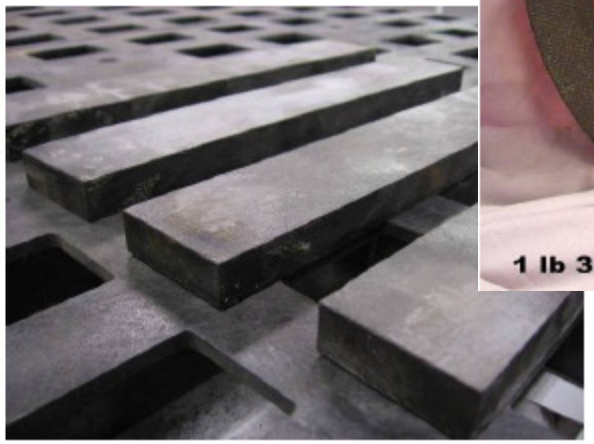
Bulk Material Applications

Circuit Boards

Disk Brakes

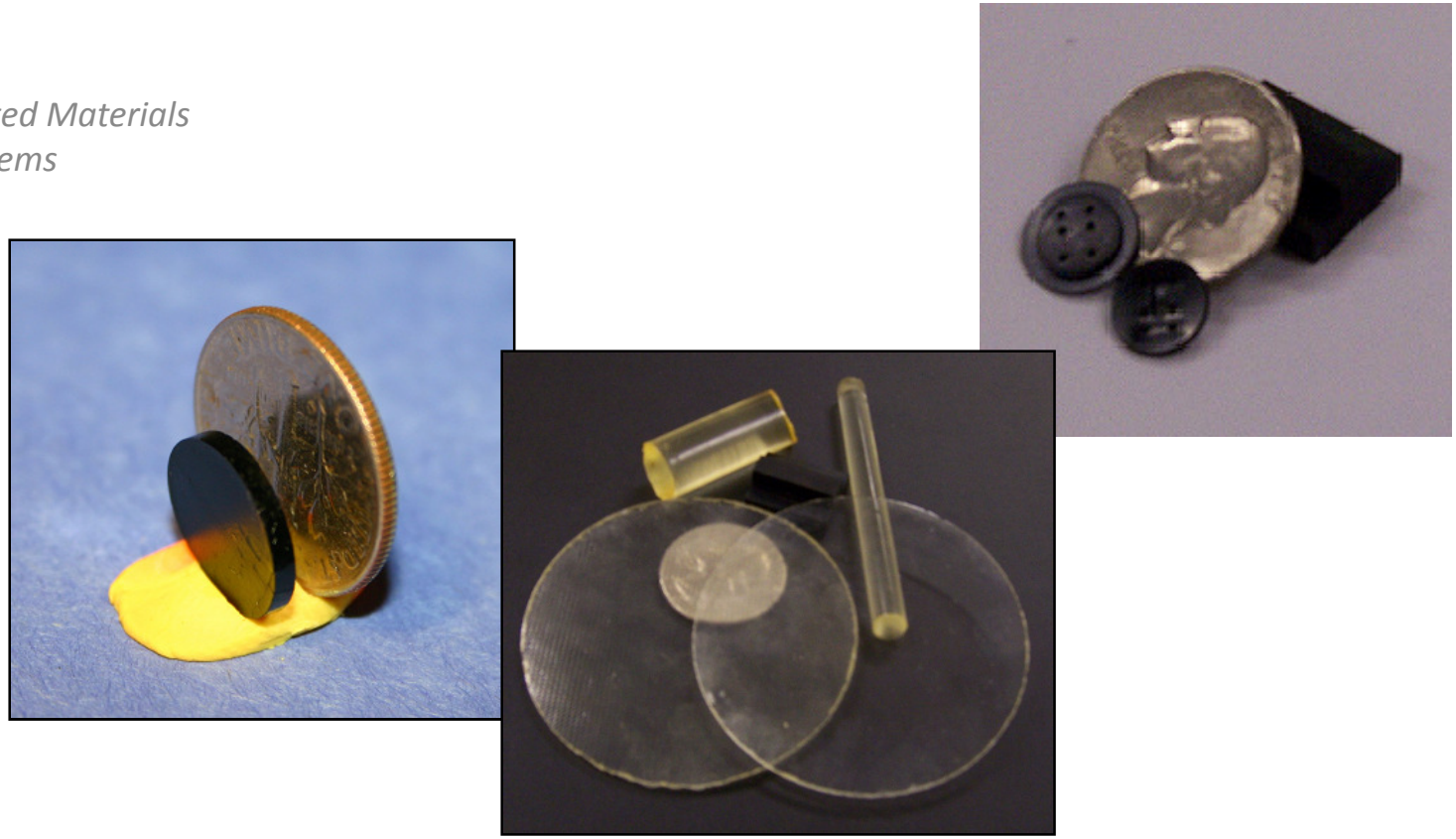
Ref: Starfire Systems





Bulk Material Applications

Ref: United Materials and Systems



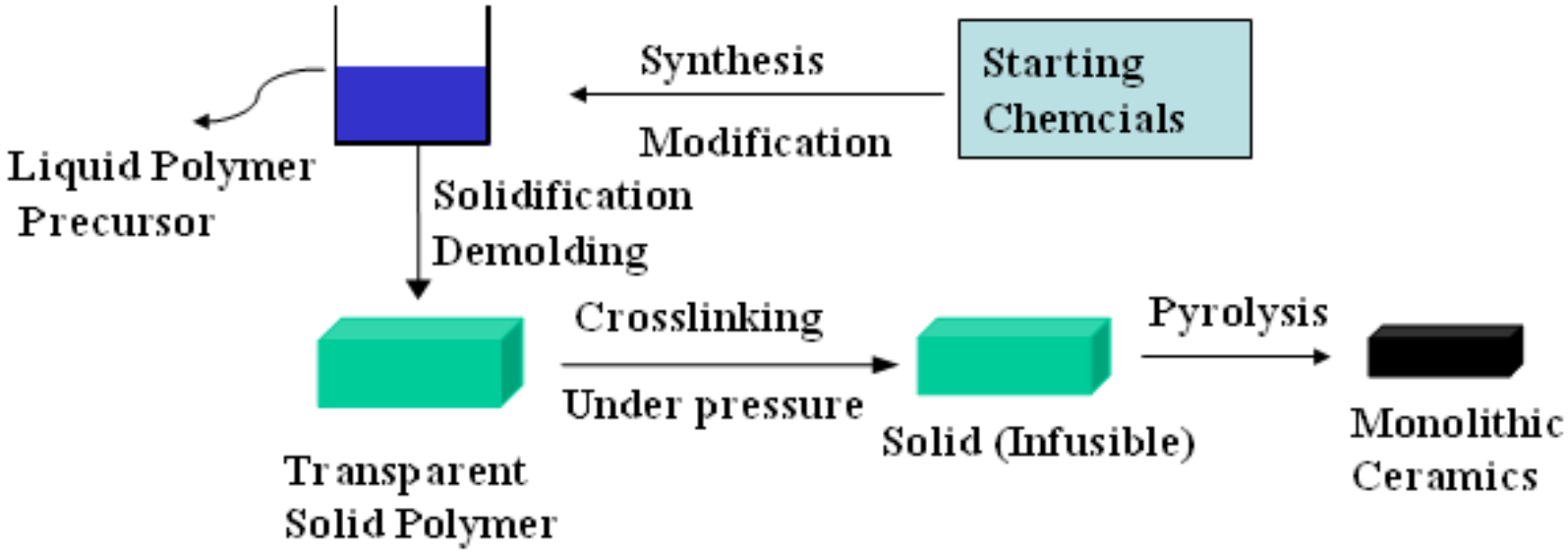
Deliverable for NASA

- Process Overview
- Green Body Development
- Ceramic Mirrors

Process Overview

Polymer Derived Ceramic Precursors = *Fetal Ceramic*

Working with Fluid, Curing with Heat and/or Light



Green Body Development

Green Body

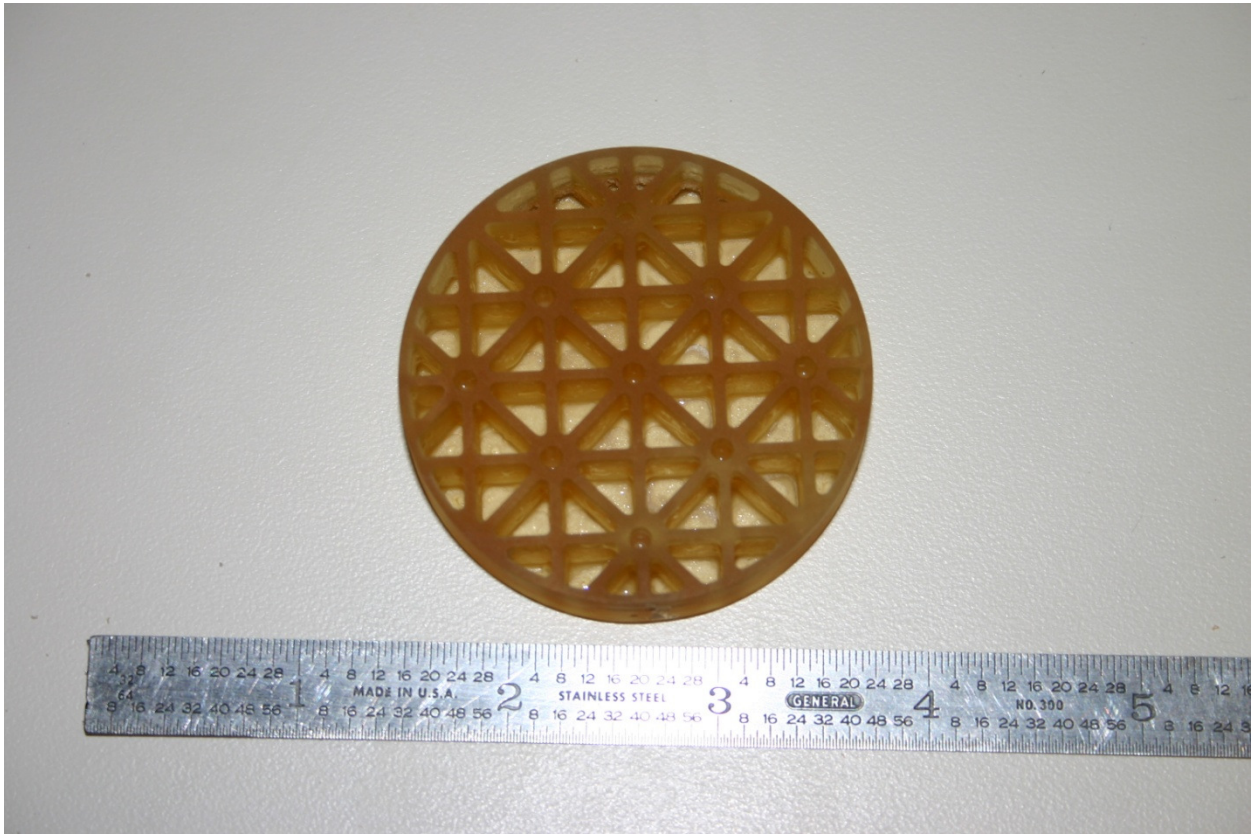
(Ceramic Children)

Machining

is performed to yield near net shape, while plastic

No tooling

Low energy consumption



Ceramic Mirrors

Unique Adult Ceramic

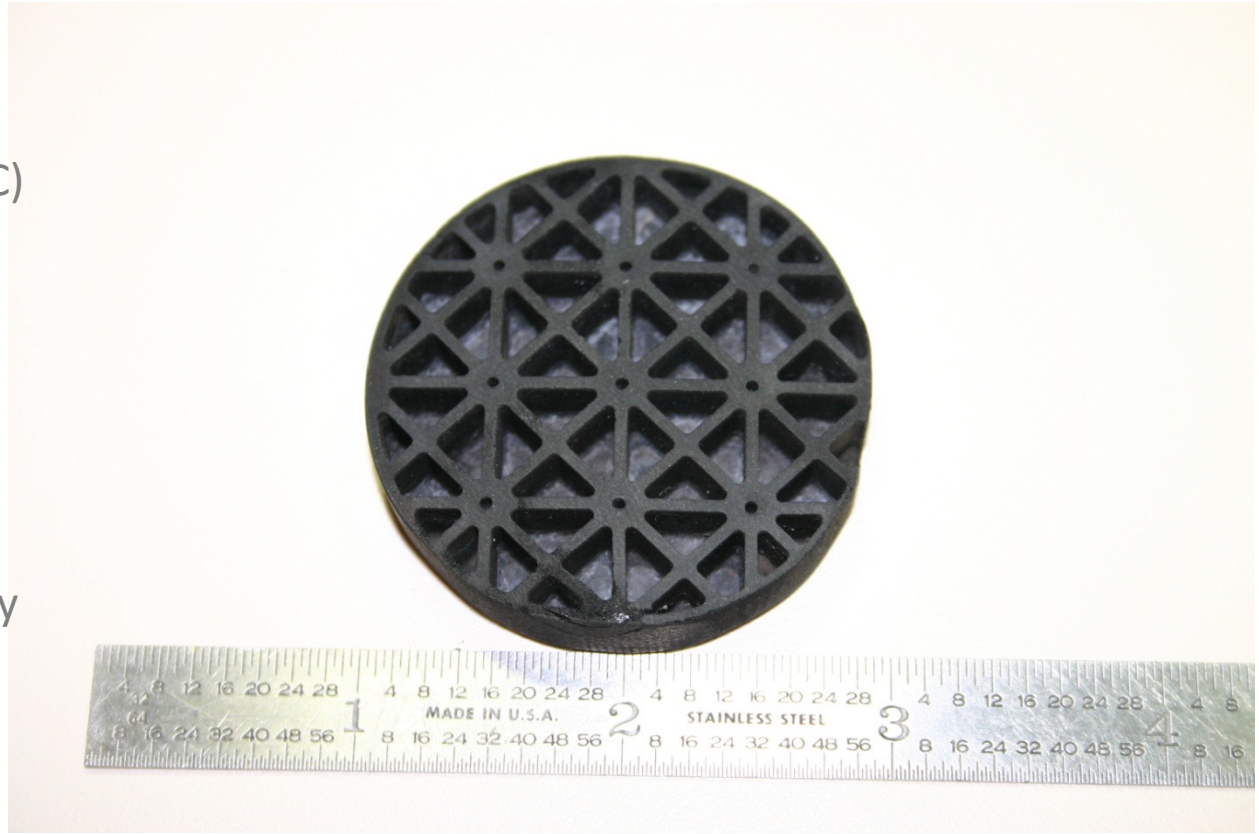
Processed to 800-1000 (deg C)
Less energy consumed than with sintering

Grinding Polishing

Accomplished relatively easily

Metalizing

Looking at feasibility options



Overview of Technology Fit

- Fit with NASA Mirror Program
- Summary

Fit with NASA Mirror Program

FOCUS : Areal Cost rather than Areal Density

HST primary mirror has an areal density of 175 Kg/m^2

(glass = heavy)

JWST primary mirror has an areal density of only 13.2 Kg/m^2

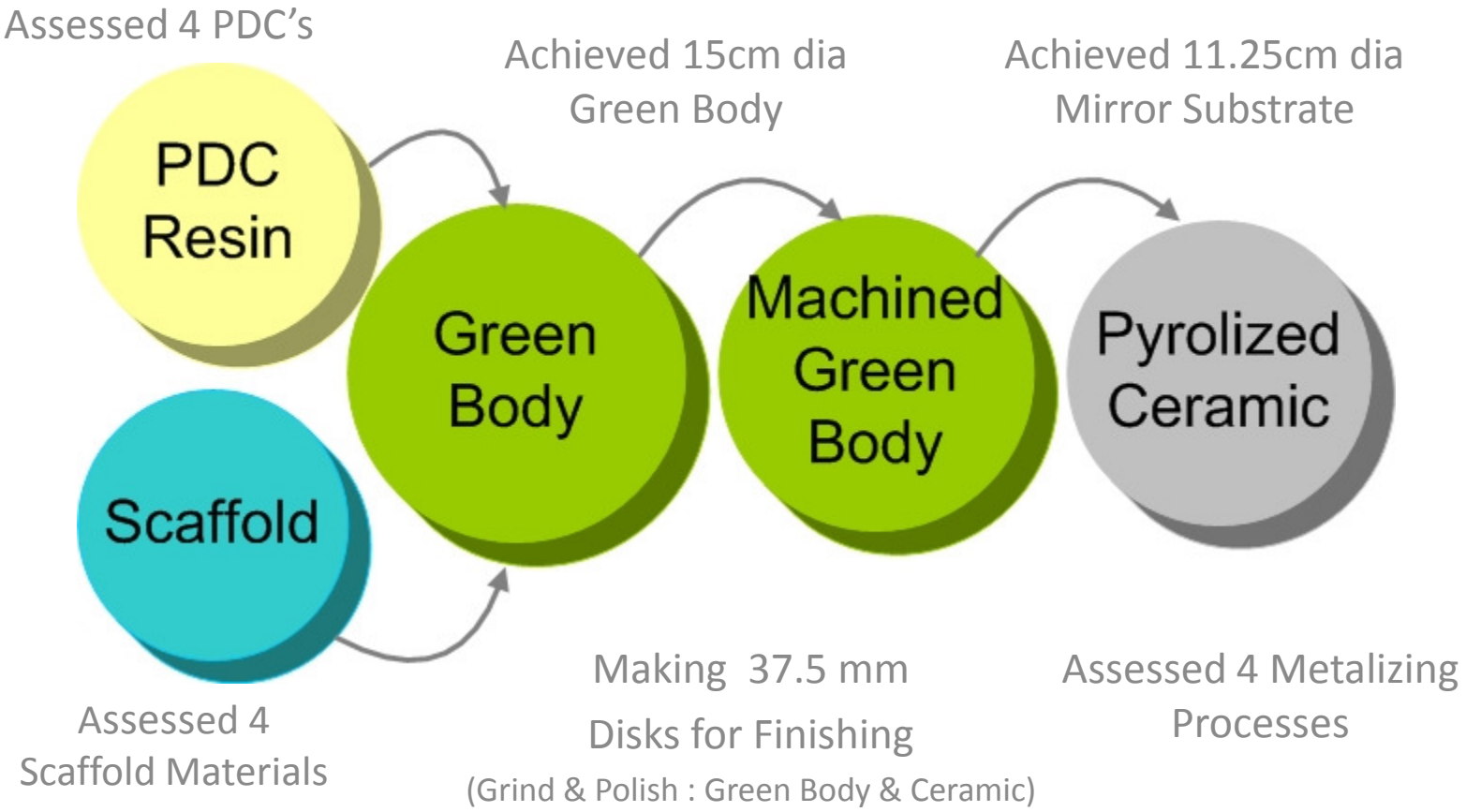
(beryllium = toxic)

Silicon Carbide high temperature sintering >1500 deg C, extremely hard

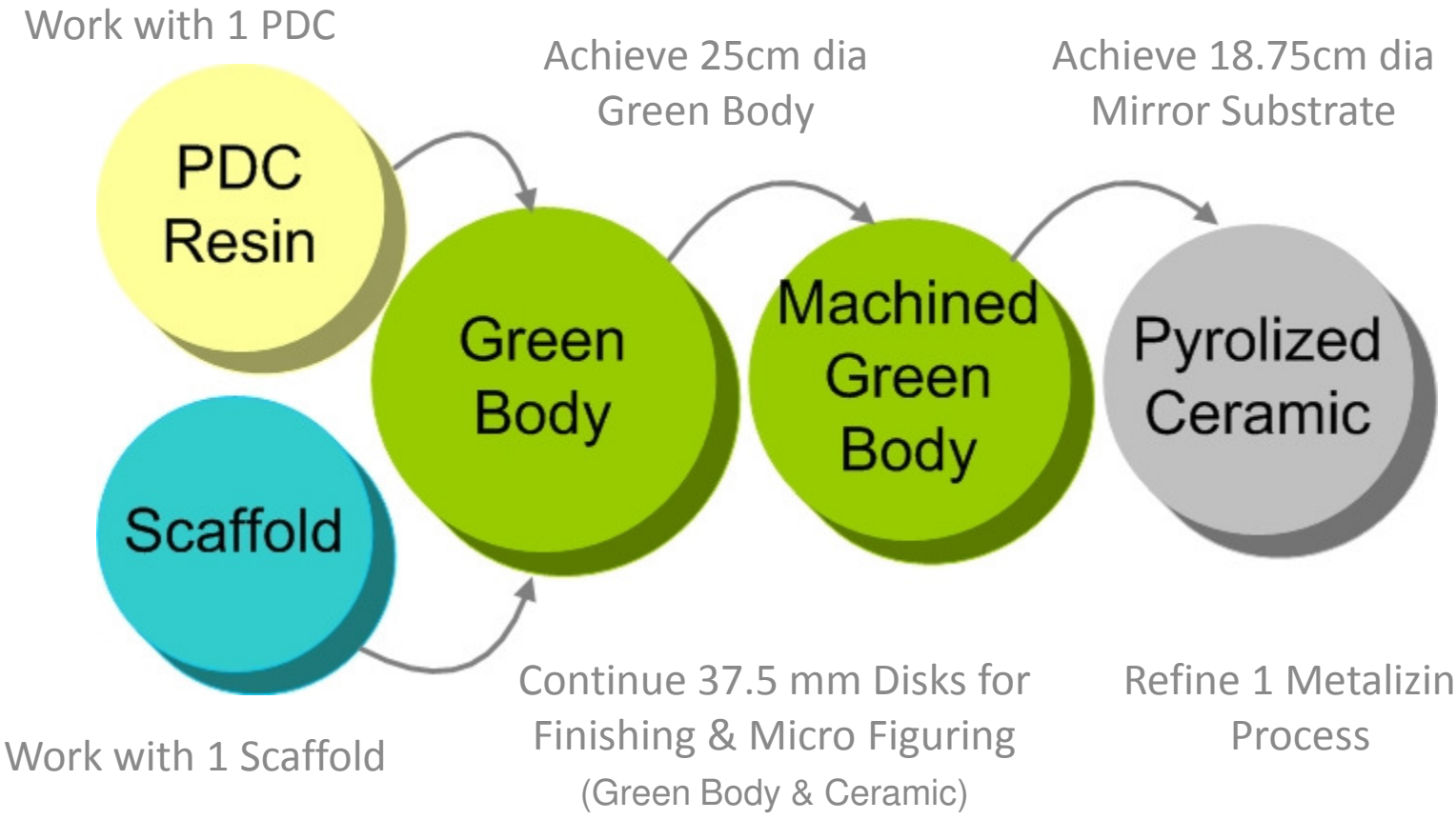
SiCN pyrolyzed at 1000 deg C… softer than SiC, but harder than glass

SiCN has an amorphous structure which takes a polish well

Summary (Interim 1 & 2)



Summary (Final Interim)



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